shock in London. Mr. Ernest Myers writes from 31 Inverness Terrace, W. :—"A slight but unmistakable shock was felt here about 8.20 p.m. There was no rattling of windows or other sound. The vibration seemed to be from side to side." Mr. E. W. Haines, of Alexandra Road, St. John's Wood, says :—"The earthquake was distinctly, though slightly, felt here last evening at 8.30." A member of the firm of Yates, Crighton, and Co., of Cannon Street, E.C., while working in their offices on Thursday evening, distinctly felt four shocks just before 8.30. He says :—"It was the more noticeable as our offices are situated in a huge building, on the third floor, and the sensation was just as if the whole block were rocked by the wind from south to north." "C. W. H." writes from the General Post Office :—"Last evening I was sitting in my room, situated in the south-west corner, top story of the General Post Office, when I felt my chair oscillate with a slight tremulous motion, which lasted perhaps four seconds. Thinking it was a slight shock of earthquake, I stood up, and looking at my watch saw the time was 8.20." A person living at West Kensington reports having felt the shock at 8.15. Mr. F. Yates, writing from Park Street, Southwark, S.E., May 31, says :—"Yesterday evening, between 8.20 and 8.25, while sitting in my library at Surbiton, I distinctly felt two light shocks, which I attributed to earthquake. The shocks were also observed by other members of my family."

Mr. J. Lloyd Bozward writes to us from Henwick, Worcester, that the earthquake was perceptible there. While seated in a room on the second floor of his house at about 8.23 p.m. on Thursday, all being still, he felt five distinct tremors in rapid succession, the third being the most notable. "On making immediate inquiries," he says, "I learned that the tremors had not been felt on the other floors, but my son, who happened to be in the basement on the occasion, says that at the time referred to by me he noticed that the flame of a lamp burning on the table suddenly shot up above the top of the glass chimney."

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The Annual Report of the Museums and Lecture Rooms Syndicate, just issued, contains much interesting information about the progress of natural science studies and collections.

Prof. Babington announces that the late Prof. Churchill Babington's extensive herbarium has been presented to the Botanical Museum by his widow, including the typical specimens of lichens described by him. The type collection has been enlarged, and demonstrations in organography and histology are regularly given. Mr. Potter has just returned from Ceylon with a fine collection. A series of germinating seedlings (prepared by Mr. Barber), specimens showing the injuries caused to plants by insects (by Mr. Shipley), and Kny's diagrams, given by Mr. Thiselton Dyer, are among the valuable acquisitions.

Mr. J. W. Clark, Superintendent of the Museum of Comparative Anatomy, reports the gift of a beautiful collection of spiders, with accompanying drawings, by Mr. Warburton; the mounting of the skeleton of *Rhytina gigas;* the deposit of a valuable collection of skulls and bones of Bovidæ and Cervidæ, by Mrs. Stewart, widow of Surgeon-General L. C. Stewart; Surgeon-General Day has given 357 birdskins from India and Burmah; and Messrs. Cordeaux have given over 100 valuable Indian specimens.

Two parts of the "Morphological Studies" have been issued by Mr. Sedgwick since the last Report. The Elementary Biology Class numbered 167 in the Easter term of 1888, and 139 in the Lent term of 1889. The Morphology Class varied from 77 to 42; with a smaller advanced class.

Prof. Macalister reports the addition of 131 Egyptian skulls, 25 skulls from the Saxon burial-place at Hauxton, and many from that behind St. John's College. The Rev. J. Sanborn, of Lockport, N.Y., has given valuable skulls from a burying-place of the Seneca Indians.

Prof. Roy describes the careful and systematic arrangement he has adopted in his Pathological Laboratory (late the Chemical Laboratory).

Prof. Hughes once more deplores the long postponement of the new Geological Museum. It certainly is not just to allow the donors of the funds to die out and never see the erection of the Museum towards which they contributed such large sums. Important additions have been made to the Cambrian and Silurian fossils by Mr. Marr, and many of them have been described and figured by him. Thirty-four figured types from the Inferior Oolite of Dorsetshire have been presented by the Rev. G. F. Whidborne. About 130 slides have been added to the cabinet of microscopical preparations of rocks. Much progress has been made in palæobotany, and two courses of lectures have been given by the lecturer, Mr. Seward. Mr. Strickland's collection of fossils, numbering 7000 specimens, has been presented by the late Mrs. Strickland.

The new Chemical Laboratory proves to be very satisfactory in working.

The demonstrations in the Cavendish Laboratory were attended by 136 students last Michaelmas term and 144 in the Lent term. Twelve persons have been doing original work in the Laboratory during the year. Some important new apparatus has been acquired.

SCIENTIFIC SERIALS.

Mémoires de la Société d'Anthropologie de Paris, série ii., tome iv., fasc. 1 (Paris, 1889).—Pre-Columbian ethnography of Venezuela, by Dr. Marcano. The author prefaces his special ethnographical remarks with a short geographical notice of the Venezuelian territory, entering more particularly into the physiographical character of the fertile valleys of Aragua and Caracas. The special feature of the landscape in these picturesque regions is the range of low hills locally characterized as "Cerritos," which extend over a large area near the beautiful lake of Valencia, first known to the Spaniards as Lake Tacarigua, and which were regarded by the native Indians as natural features of the soil. It has been discovered, however, by recent explorers, that they are artificial elevations, raised in past ages by some aboriginal Indian race long extinct, whose very name is unknown to the present inhabitants of the district, although the shores and bottom of the lake testify, through their vast accumulations of bones and other *débris*, that the country must have been densely populated at some remote prehistoric period. Dr. Marcano, who devoted several years to the exploration of the Cerritos, near Lake Valencia, has succeeded in laying bare the interiors of twenty of these mounds, which prove to be sepulchral caves filled with bone and other detritus. All present a uniform plan of arrangement, and consist of a central circular walled-in space, containing an enormous mass of whole and fractured bones, and marine and fresh-water shells, with fragments of stone, bone, and wood implements, and sherds of pottery, most of which bear traces of the action of fire. The human remains were deposited in round earthen jars or urns, each of which contained only the separate bones of one body, the skull resting at the base of the vessel, while the sacrum, with the long and the small bones, was laid above it so as to fit into all the available space. The appearance of these bones indicates that the flesh had been detached from the dead body before its interment, but their brittle condition rendered a minute examination impossible in some cases, although Dr. Marcano was able to recover forty crania which admitted of sufficiently exact investigation to warrant the conclusion that they represent two distinct types of brachycephalism. About half of these crania showed signs of deformity, due to artificial pressure over the frontal bones. The most remarkable characteristic was their prognathism, which exceeded that of any skull previously examined by him, although his observations were based on the examination of more than 2000 crania, of which some belonged to New Caledonians, who have hitherto ranked as belonging to the most prognathic race extant. The implements found in the Cerritos caves are nearly identical with those associated with the Neolithic age in Europe, while the animal remains are composed of types belonging to the local terrestrial and aqueous faunas, including the broken skull of a cebus; while so enormous a mass of the bones of a caïman (*Crocodilus bava*, which is peculiar to the Lake of Valencia and its affluents) was found, that it is evident the flesh of this animal must have served as food. A number of detailed craniological tables, and numerous illustrations of the crania and of the curious figurines and idols, the urns, tools, ornaments, and other objects interred with the human bones, add greatly to the value of Dr. Marcano's exhaustive memoir.—The superstitions prevalent in Wales, by M. Maricourt. In this article the author has drawn his materials so indiscriminately from

casual travelling companions, and from writers of the most various degrees of authority, that his statements can lay no claim to the serious attention of students of folk-lore, and present no interest for the English reader.

SOCIETIES AND ACADEMIES.

LONDON.

Physical Society, May 25.—Prof. Reinold, President, in the chair.—The following papers were read:—On a relation existing between the density and refraction of gaseous elements and some of their compounds, by Rev. T. Pelham Dale. In a previous communication the author pointed out a relation between the specific refractive energies of sulphur and selenium, and the present paper deals with similar relations in gaseous bodies. On calculating out the values of $\frac{\mu - 1}{d}$ for the elements H, O, N, Cl, S, P, it was noticed that the logarithms were nearly integral multiples of half the logarithm for H, those for N, Cl, and P being double, and S and O three times that number. The value of $\mu - 1$ for different elements is compared with the $\mu - 1$ for H, the resulting numbers being, for oxygen 2, mercury 7, arsenic 8, and sulphur 12 nearly. Similar calculations are made for the compounds N_2O, NO, CO, SO_2, Cy, NH_3, HCl, H_2S, CH_4, and C_2H_4, but as the data obtainable are very rough, the numbers are not so closely integral. The author hopes that better data will be furnished by persons having greater facilities than himself for experimental research. Prof. Rücker thought the results obtained pointed towards some relation between the volumes of the molecules of different elements, and at the close of the meeting announced that on working out the relation he found the relative volumes to be a series of numbers in geometrical progression.—On a water-spray influence machine, by Mr. George Fuller. The apparatus is made up of four similar sections, each consisting of a nozzle, a metal ring, and a metal dish or receiver, arranged about a vertical axis. Pressure-water issues from perforations 1/100 inch in diameter in the nozzles, and passes through the rings into the insulated receiver below. The rings are placed at such a distance below the nozzles as to be about the point where the streams break into spray, and the receivers empty themselves automatically. Calling the consecutive sections 1, 2, 3, 4, respectively, the rings of 1 and 3 are connected to the receiver of 4, and those of 2 and 4 to the receiver of 1. The discharge-points are connected with the receivers 2 and 3, and a rapid succession of sparks passes when the water is turned on. Prof. S. P. Thompson inquired whether the length of the spark was limited by leakage along the glass rods or by the spray passing between the receivers, and in reply Mr. Fuller said he thought the former leakage the most important.—Notes on polarized light: (*a*) on the transition tints of various orders; (*b*) lecture illustrations of the rotation of circularly-polarized light; (*c*) on the rotation of circularly-polarized and non-polarized light, by Prof. S. P. Thompson. The first note described an inquiry as to what thickness of quartz gives the best "sensitive tint" for polarimetric work. Biot gave the name to the tint produced by a quartz $3\frac{3}{4}$ millimetres thick in a bright field, whereas in most modern polarimeters the name is given to that produced by $7\frac{1}{2}$ millimetres of quartz in a dark field. The transition-tints of various orders were exhibited on a diagram of Newton's scale of colours, and by a wedge of selenite. Experiments were made on quartzes of $3\frac{3}{4}$ and $11\frac{1}{4}$ mm., giving tints of the first and second order respectively in the bright field, and with a $7\frac{1}{2}$ mm. quartz in a dark field. The $3\frac{3}{4}$ was more sensitive than the $11\frac{1}{4}$ to small rotations, but the $7\frac{1}{2}$ mm. seemed the best of the three. Prismatic analysis of the light transmitted by each led to the same conclusion—a new square-ended direct-vision prism built up of a glass prism (angle 140°) immersed in cinnamic ether being used for that purpose. The author pointed out that the "sensitive tints" of German opticians are decidedly redder than Biot's, and those generally used in England. In the first apparatus devised under (*b*), the ray of light is represented by a stretched cord thrown into promiscuous vibration by a tuning-fork, and the polarizer and analyzer are each represented by two plates of glass mounted parallel to each other about a millimetre apart, between which the cord passes. Between the polarizer and analyzer the vibrations are in one plane, and they are transmitted or cut off by the analyzer according as its plates are parallel or perpendicular to those of the polarizer. By blowing across one side of the spindle-shaped vibrating segment between the crossed plates, the plane of vibration is slightly rotated, and part is transmitted through the analyzer. Other experiments illustrating rotation of the plane of polarization were shown or described, the most conclusive being a bar of heavy glass placed along with a fish-eye lens between crossed Nicols. On starting a current in a helix surrounding the glass, the black cross formed by the fish-lens is seen to turn round as the current grows. Another piece of apparatus to illustrate Fresnel's view of the circularly polarized waves in quartz consists of two equal coplanar disks rotating in opposite directions, and carrying pins on which the extremities of a double pantograph arrangement are pivoted. The middle point of the link-work describes a line perpendicular or inclined to the line of centres of the disks according as the phases of the pins are the same or different. (*c*) In speaking of rotary polarization it is customary to say that the plane of polarization is rotated, but the author thinks it is equally correct to say that the light itself is rotated. Prof. Stefan's and Prof. Abbe's experiments bearing on the subject were described, and to demonstrate that ordinary light may be rotated, a biquartz was placed between a Fresnel biprism and the screen on which the interference fringes were formed. By using quartzes of thickness sufficient to rotate each beam 45°, the interference fringes are caused to disappear, and on inserting a bar of heavy glass in each of the pencils, and magnetizing one of them, the fringes reappear. Mr. Glazebrook thought the reason why $3\frac{3}{4}$ mm. quartzes were more sensitive than $11\frac{1}{4}$ might be seen by considering the sector-shaped spectrum in which the rays are spread out by the quartz, for with the thick piece the angle of the sector will be three times that with the thin one, and hence, in the latter case, a greater change of colour is produced by a given small rotation. Mr. Ward strongly condemned the use of biquartzes for rotation measurements, for he found it impossible to get them cut with such accuracy as to give a uniform tint; and if the light be slightly elliptically polarized, considerable error may be introduced. Speaking of magnetic rotation, he thought Fresnel's explanation unsatisfactory, and considered it probable that the rotary character of the magnetic field increases the period of one and decreases that of the other circular wave, their velocities remaining the same. As regards quartz, he believes the rotary action due to the light itself (probably an effect of the longitudinal wave), and not to any peculiar crystalline structure of the quartz, for liquids exhibit similar phenomena. Dr. Thompson, in reply, said Mr. Glazebrook's explanation of the difference in sensibility of the quartzes of various thicknesses was not quite satisfactory, for the reasoning would lead one to expect the $3\frac{3}{4}$ millimetres to be most sensitive, whereas experiment showed that the $7\frac{1}{2}$ millimetres was best. He quite agreed with Mr. Ward about the defects of the biquartz, and thought the shadow method preferable in many cases. On the other hand, he was disposed to believe that the rotary power of quartz was a result of its crystalline structure, for fused quartz possessed no such property. As regards liquids, Dr. Thompson thought the rotation due to some kind of skew symmetry possessed by the molecules, the average effect of which is observed.—On the molecular weight of caoutchouc and other colloid bodies, by Dr. J. H. Gladstone, F.R.S., and Mr. W. Hibbert. This paper gives the results of determinations made by Raoult's method, the reliability of which was first tested by preliminary experiments on substances of known molecular weights, and found to be fairly satisfactory. The experiments on caoutchouc give a very high value (above 6000), thus confirming the author's previous impression that it was a colloid. Similar experiments were made on gum-arabic, caramel, albumen, and ferric and aluminic hydrates, all of which were found to have high molecular weights. All the experiments confirm the belief that the molecule of a colloidal substance is an aggregate of a very great number of atoms.

EDINBURGH.

Royal Society, May 20.—Sheriff Forbes Irvine, Vice-President, in the chair.—A paper, by Prof. Letts and Mr. R. F. Blake, on the identity of Hofmann's "dibenzyl phosphine" with oxide of tribenzyl-phosphine, and on some other points connected with the phosphorized derivatives of benzyl, was read.—Sir W. Turner communicated a paper by Dr. D. Hepburn, on the development of diarthrodial joints in birds and mammals.—Dr. G. Sims Woodhead communicated observations by Mr. D. McAlpine on the progressive movement of detached ciliated portions of frogs and tortoises, and also observations on the progression, pulsation